On ternary feet

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On Ternary Feet

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0. Introduction

Halle and Vergnaud (1987, henceforth H & V) claim that the only permitted ternary foot in natural language is amphibrach (wsw) as in (1a) but not dactyl (sww) or anapest (wws) as in (1b and c):

(1) a. * b. * c. *
(* * *) (* * *) (* * *)
w s w s w w w w s
amphibrach dactyl anapest

Haraguchi (1991) challenges this thesis and argues that all feet, as well as other metrical constituents, should be restricted to head-terminal ones, further claiming that no head-medial feet be allowed in natural language.

In this paper, assuming the theoretical framework of Haraguchi (1991), I will provide further evidence in support of the contention that ternary feet should be head-terminal, showing that my earlier position is basically correct.

This paper is organized as follows: In section. 1, I will analyze Mantjiltjara, an Australian Aborigine language, and argue that this language chooses binary or ternary feet in a fairly free manner. In section 2, I will analyze another Australian Aborigine language, Walmatjari, and show that the parameter settings of this language are very similar to those of Mantjiltjara. In section 3, I will focus attention on Gaalpu, a Yuulngu dialect of an Australian language, and argue that

ternary feet in this language should be restricted to dactyls. Section 4 is devoted to some brief concluding remarks.

1. Stress in Mantjiltjara

Let me begin with an analysis of stress in the Australian Aborigine language Mantjiltjara. Based on the works of Marsh (1969), Odden (1979) and others, Davis (1985) proposes the following system in order to account for the stress system of this language:

(2) a. Build optionally binary or ternary left-headed feet from the beginning of the word.
b. Build a left-headed word tree.

To illustrate this analysis, Davis cites the following seven syllable words.

(3)	a. 'ŋuRil"payili"tjunku[1]	'We (pl. excl.) were looking for you'
	b. 'kayili"Riŋu"latju	'We (pl. excl.) went north'
	c. 'Ninti"tjula"tjananja	'Inform them!'

In (3), primary stress falls on the first syllable. Secondary stress falls on the third and sixth syllables in (3a), on the fourth and sixth syllables in (3b) or on the third and fifth syllables in (3c).

To put it differently, in (3a) the first foot is binary, the second foot is ternary and the third foot is binary; in (3b) the first foot is ternary and the second and the third feet are binary; in (3c) the first and the second feet are binary and the third foot is ternary. Davis notes that while either of the other two stress patterns are possible for the words in (3), those shown are the preferred pronunciations.

It should be clear that the ternary feet in (3a,b) cannot be handled in terms of extrametricality as the peripherality condition on extrametricality prevents such an analysis.[2]

Basically following Davis' analysis, I propose that Mantjiltjara has the following parameter settings:

(4) a. Line 0 parameter settings: [+BND, {Binary or Ternary}, Left-headed, Left-to-right].
b. Line 1 parameter settings: [-BND, left-headed].

This system correctly assigns primary stress on the first syllable of two or three syllable words:

(5) a. ‘yapu 'stone'
b. ‘ŋakumpa 'deaf'

Marsh (1969) notes that "in four syllable words primary stress falls on the first syllable" and that "secondary stress falls on the third syllable or is absent."

(6) a. ‘r.aka"r.aka[3] 'brave'
b. ‘paRpakala 'fly!'

We can account for the stress assignment in (6a) if we assume that the relevant line 0 parameter is set to 'binary'. (6b) is assumed to be derived by Star Deletion, as illustrated in (7):

(7)

*		*
(* *)	Star Deletion	(*)
(* * *)(*)	→	(* * *) *
‘paRpaka la		‘paRpaka la

I assume that this deletion is induced by a language-particular principle which excludes degenerate feet.[4]

Notice that the stress facts of this language could not be analyzed in a natural way within the H & V framework, which assumes that amphibrachs, as in (8), are the only type of ternary feet permitted:

(8)

*
(* * *)

In H & V's framework, the parameter settings needed for correct assignment of this foot should be something like those in (9):

(9) [-HT, +BND, left-to-right (or right-to-left)]

Supposing that this is the case, the line 0 parameter settings of Mantjitjara would have to be something like (10) in H & V's framework:

(10) Line 0 parameter settings are [+BND, left-to-right, {-HT or (+HT, Left-headed)}]

It should be clear that the parameter settings in (10) are rather awkward, which suggests that there is probably a better generalization, not captured in H & V's machinery.

In addition to this, we would have to resort to the notion of extrametricality, as in (11a), or stress deletion, as in (11b), to account for (3c):

(11) a.
```
*
(*     *   *)
(* *) (* *) (* *)<*>
'Ninti "tjula"tjananja
```

b.
```
*                    ↓ stress del.
(*     *   *   *)
(* *) (* *) (* *)(*)
'Ninti "tjula"tjananja
```

The analysis in (11a) lacks explanatory adequacy in that we cannot predict which cases necessarily involve extrametricality. In the case of (11b), we need to question of why stress deletion, which makes the derivation of (11b) more complex, should be at work here.

Taking the above observations into consideration, I contend that an apparent alternative analysis based on H & V's theory should not be taken to be a genuine alternative to my analysis of Mantjitjara stress facts. This also leads us to conclude that H & V's amphibrach analysis should be dispensed with.

2. Stress in Walmatjari

Let us now turn to the analysis of stress patterns in Walmatjari. Hudson & Richards (1969) observe that words in this language normally have primary stress on the first syllable, with some exceptions, as illustrated in (12):

(12)	a.	'yapa	'child'
	b.	'yutanti ~ yu'tanti	'Sit!'
	c.	'tjini"njar.a	'midday'

d.	'paljma"nana ~ palj'manana	'touching'
e.	'walaku"waNTi[5]	'sons'
f.	'walaku"waNTiLu	'sons (subj.)'
g.	'njumukku"tjiNi ~ 'njumuk"kutjiNi	'cause to bathe'

(12a) shows that two-syllable words are stressed on the first syllable. In (12b) we see that primary stress falls on either the first or second syllable of most three syllable words.[6] (12c) illustrates that in four-syllable monomorphemic words, primary stress falls on the first syllable and secondary stress on the penultimate syllable. (12d) shows that in the case of four-syllable words consisting of more than one morpheme primary stress is assigned to either the first or second syllable. In the former case, secondary stress falls on the penultimate syllable. (12e and g) illustrate that in five-syllable words, primary stress falls on the first syllable, with secondary stress falling either on the penultimate syllable or on the antepenultimate syllable. Finally, (12f) illustrates that six-syllable words have primary stress on the first syllable with secondary stress falling on the antepenultimate syllable.

To correctly predict these stress patterns, I suggest, basically following Davis (1985), that the parameter settings of this language should be as follows:

(13) a. Line 0 parameter settings: [+BND, {Binary or Ternary}, Left-headed, Right-to-left].
b. Line 1 parameter settings: [-BND, Left-headed].

I assume that the stress facts witnessed in (14) are derived by the application of an additional deletion rule under Clash Avoidance, as indicated in (15):[7]

(14) a. yu'tanti (= 12b)
b. palj'manana (= 12d)

(15) a.

*		*
(* *)	by deletion	(*)
(*) (* *)	→	(*) (* *)
yu'tanti		yu 'tanti

b.

*		*
(* *)	by deletion	(*)
(*) (* * *)	→	(*) (* * *)
palj'mana na		palj'manana

I assume the reason that the line 1 asterisk on the first syllable is deleted under Clash Avoidance is due to the fact that stress on the degenerate foot is weaker than that on the full foot. (For further discussion on relative strength hierarchies and related matters, see Haraguchi (1991).)

Note that the parameter settings of this language specified in (13) are very similar to those of Mantjiltjara as given in (4), with the sole difference being the value of the directionality parameter.

With regard to H & V's amphibrach-foot analysis, I believe there is an argument against it, which is parallel to that put forward in the previous section. However, due to the limitation of space, I will not discuss the argument here.

3. Stress in Gaalpu

Let me now analyze stress patterns of Gaalpu, a Yuulngu language in Australia.[8] My discussion of this language below is based on Wood (1978), who provides a detailed observation of the phonological patterns of this language.

As summarized in (16), primary stress in Gaalpu falls on the first syllable:

(16)

a. 1-syl.	'o[9]	‘paT	'after'
b. 2-syl.	'oo	‘rakal	'greedy'
c. 3-syl.	'ooo	‘rawaktij	'to shrivel up'
d. 4-syl.	'oo"oo	‘payi"kuya	'that (Gen-Dat, Emph)
e. 5-syl.	'ooo"oo	‘tjinpulkku"wanam	'to sharpen'
f. 6-syl.	'ooo"ooo	‘kulŋiyi"njarawum	'to enter (nominalized)'

Secondary stress falls on the third syllable of four-syllable words and on the fourth syllable of five-or-more-syllable words.

Wood (1978) observes that in Gaalpu, morpheme boundaries, represented as (++), found in words containing a reduplicated or compound stress, prevent the continuation of ternary stress. Following the boundary, ternary stress starts over again, as illustrated schematically in (17):

(17) a. 'o ++ "ooo
b. 'oo ++ "oo
c. 'oo ++ "ooo
d. 'oo ++ "ooo"oo
e. 'oo ++ "ooo"ooo

These facts can be obtained straight forwardly by employing a formal device which interprets the word boundary as the left bracket '[' (or alternatively the right bracket ']'). This device is reminiscent of Halle's (1989) "idiosyncratic constituent boundaries," proposed to handle certain stress facts in Cairene and Chugach Yupik. These boundaries are introduced under the following constraints:

(18) a. A constituent boundary introduced in the lexical rule or by a special rule must coincide with a syllable boundary; it cannot be syllable-internal.
b. Only one of the two constituent boundaries -- the left or the right -- may be assigned by rule. When the constituents are constructed from left to right it is the left boundary that may so be assigned, whereas when constituents are constructed from right to left it is the right boundary. When the direction of constituent construction is not stipulated, the choice of boundary assigned by rule is arbitrary.

Here I basically assume these constraints, although it seems to me that they will be derived from more general principles. (See Tanaka (1990) for some discussion.)

Wood (1978) further observes that some seven-syllable words behave the same as the initial roots of compound and reduplicated stems:

(19) a. 'n^ina"t^unkanmi"njar.awu[10] 'to set down(Gen-Dat)'
b. 't^aya"nar.amiŋ"kantawu 'to stand (Gen-Dat)'

Wood (1978) notes that these words are derived from the verbs *njiina* 'to sit' and *t^aaya* 'to stand' respectively. I analyze these as being derived from the regular underlying pattern 'ooo"ooo"ooo by subsequent vowel shortening of the long vowel of the initial syllable.

I propose that the facts illustrated above can be accounted for by the following system of parameter settings and a refooting rule:

(20) *Gaalpu:*
a. Line 0 parameter settings: [+BND, Ternary, Left-headed, left-to-right].
b. Line 1 parameter settings: [-BND, Left-headed].

(21) *Refooting:*
(* * *)(*) → (* *)(* *)

Refooting in (21), which is virtually identical to the refooting rule discussed in Halle (1989), is one possible way of avoiding a violation of the principle in (22):

(22) Exclude the degenerate foot of the form (*) in word-final position of longer words.

This principle accounts for the fact that the stress pattern of four syllable words is not of the form shown in (23):

(23) * *
(* * *)(*)

With respect to (22), Wood (1978) observes that four-syllable pronominals often have initial stress only. This is illustrated as follows:

(24) (i) a. ‘t^upa”liŋku b. ‘t^upaliŋku 'they two (Gen-Dat)'
(ii) a. ‘ŋalma”liŋku b. ‘ŋalmaliŋku 'we (Gen-Dat)'

The (a) forms are derived from (23) by the interaction of the principle in (22) and the refooting rule in (21). I assume that the (b) forms in (24) are derived from (23) by the interaction of the principle in (22) and a rule to the effect of (25) below:

(25) line 0: (* → (.

This rule deletes the line 1 asterisk of the degenerate foot in (23) in conformity with the principle in (22).

Wood (1978) also observes that some words exceptionally have primary stress on the second syllable, as illustrated in the left column of (26):

```
(26) a.    *           appl. of (25)        *
           (*    *)        →         (.     *)
           pur.'wu                   pur.'wu

     b.          *         (25)             *
           (*    * *)      →         (.     *   *)
           pur.'wumi                 pur.'wumi

     c.          *         (25)             *
           (*    *)        →         (.     *)
           pad. 'ak                  pad. 'ak
```

These facts can be derived by the rule in (25), as indicated above.

Finally, consider the following examples:

(27) a. ‘marŋki”yumanta”miyu
b. ‘marŋki”yu”manta”miyu 'teacher (Erg)'

Wood (1978) notes that with many seven syllable words it is not clear whether secondary stress falls on the third or fourth syllable or on both. I assume tentatively here that words of this type have the following underlyingly (or lexically) specified stress:

(28)
```
        *  *          line 1
        *  *          line 0
'marŋki"yu"manta"miyu
```

This is converted to the following structure by (20) and the re-footing rule in (21).

(29) a.
```
*       *  *       *      line 1
(*  *) (*) (*  *  *)(*)   line 0
'marŋki"yu"manta"miyu
```

↓ by appl. of (21)

b.
```
*       *  *       *      line 1
(*  *) (*) (*  *) (*  *)  line 0
'marŋki"yu"manta"miyu
```

If (29b) remains as is, in defiance of the principle of Clash Avoidance, this word has secondary stress evenly on both the third and fourth syllables. If the stress on either the third syllable or the fourth syllable is erased to resolve the stress clash, we get (27a) or (30), respectively:

(30)
```
*                          line 2
(*          *       *)     line 1
(*  *) *  (*  *) (*  *)    line 0
'marŋki"yu "manta"miyu
```

Consider in this respect the following stress pattern, which conforms to the regular stress pattern of this language:

(31) 'marŋkiyu"mantami 'teacher'

If the above-mentioned analysis is correct, then the stress pattern of this word can be derived from the underlying structure in (32) in line with (28-30):

(32)
```
        *  *          line 1
        *  *          line 0
'marŋki yu"mantami
```

(33) a.

```
*                                line 2
(*       *  *)                   line 1
(*    *)(*) (*   *  *)           line 0
 'marŋkiyu"mantami
```

↓ by Deletion

b.

```
*                                line 2
(*          *)                   line 1
(*   *) *  (*   *  *)           line 0
'marŋkiyu"mantami
```

In order to ascertain the legitimacy of this analysis, we must undertake a more detailed observation of stress facts of Gaalpu.

Though there remain a number of unsettled points, we can safely conclude that the core stress facts in Gaalpu can be handled by a system incorporating left-headed ternary feet.

As far as I have checked, there seems to be no explanatorily adequate amphibrach-foot analysis of this language. Thus I conclude that the Gaalpu stress system provides no motivation for the amphibrach-foot analysis of H & V.

4. Concluding Remarks

In this short paper, I have added three pieces of evidence to show that ternary feet should not be analyzed as amphibrachs, but as left-headed dactylic feet.

At present, I have not found an undeniable case of an anapest foot, as in (34):

(34)?*

```
    *
(* * *)
```

I suspect that this gap in the pattern might be somehow related to the Hayes (1987) claim that even with binary feet there is a systematic gap in that there are no iambic moraic foot as in (35):

(35)?*

```
      *
  (*   *)
  M    M
```

It seems to me that languages show a tendency to avoid right-headed bounded feet under certain conditions. Though a number of possible directions to solving this problem come to mind, I will leave the matter open here.[11]

Notes

* I am grateful to Roger Martin and Shin-ichi Tanaka for their comments and suggestions. Any remaining inadequacies are my own.

1. Here [R] represents the apico-alveolar [r̬] and [N] for the apico-domal nasal [n̬]. The symbol ['] stands for primary stress and ["] for secondary stress.

2. See Hayes (1982), Davis (1985), and Halle & Vergnaud (1987) among others.

3. Here [r.] represents apico-domal liquid [ɻ̬].

4. See section 3, in which the outline of this principle is discussed. Cf. Tanaka (1990) for related discussion.

5. [T] stands for the apico-domal stop [t] and [L] for the apico-domal lateral [l].

6. Hudson & Richards (1969) note that the word *pur.'aɲu* 'sun' is exceptional in that it has primary stress on the second syllable only.

7. See Haraguchi (1991) for a detailed discussion of this topic.

8. I am grateful to Wayne Lawrence for directing my attention to this language.

9. Here, and below, [o] stands for a syllable.

10. Here, [n^] stands for [+coronal, +distributed, -tense] nasal [n̪], [t^], for [+coronal, +distributed, +tense] stop [t̪].

11. The most plausible way of solving this problem seems to be to introduce the following universal redundancy rules:

(i) a. [Ternary] ——> [Left-headed]
b. [Binary] ——> [Left-headed]
mora system

Shin-ichi Tanake (p. c.) has pointed out to me that Southern Paiute, which is a typical moraic language, utilizes the iambic foot in (35) (cf. H & V). Thus, the claim made in Hayes (1987) is not the case and the existence of (ib) seems to be rather dubious. See Hayes (1987) for a related, but different, discussion.

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